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| 10/804,610 | 03/18/2004 | Yasuo Kitaoka | 10873.1420US01 | 9547 |
| 23552 | 7590 | 09/22/2005 | EXAMINER | |
| MERCHANT & GOULD PC | | | HO, TU TU V | |
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2818

DATE MAILED: 09/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/804,610

Applicant(s)

KITAOKA ET AL.

Examiner

Tu-Tu Ho

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. **Claims 1-47** are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over **claims 1-31** of copending Application No. 10/758,815 (U.S. Patent Application Publication 20040147096, or the '096 reference for short). **Claims 1 and 30-47** are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over **claims 1-34** of copending Application No. 10/884,252 (U.S. Patent Application Publication 20050011432, or the '432 reference for short). Although the conflicting claims are not identical, they are not patentably distinct from each other.

Referring to **claim 1**, which is characterized in bringing surfaces of seed crystals of a Group III Nitride semiconductor layer into contact with an alkali metal melt for forming a Group III nitride substrate, claim 1 of the '096 reference recites bringing surfaces of gaps of a Group III nitride semiconductor layer into contact with an alkali metal melt for forming a Group III nitride

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substrate, and claim 1 of the '432 reference recites bringing surfaces of crystal-nucleus generation regions of a Group III nitride semiconductor layer into contact with an alkali metal melt for forming a Group III nitride substrate.

Referring to the limitation forming a patterned mask film on the Group III nitride semiconductor layer or on a base substrate of **claims 2, 12, and 25**, claims 8 and 17 of the '096 reference recites forming a patterned mask film on the Group III nitride semiconductor layer or on a base substrate.

Referring to the limitation oxidizing portions of a surface of the underlying Group III nitride semiconductor layer to form oxidized regions for functioning as a mask ("oxidizing portions of a surface of the Group III nitride semiconductor layer to form oxidized regions; and (C) in an atmosphere including nitrogen, bringing the surface of the Group III nitride semiconductor layer into contact with a melt containing the nitrogen, alkali metal, and at least one Group III element selected from the group consisting of gallium, aluminum, and indium, and thereby growing Group III nitride crystals on the Group III nitride semiconductor layer, with portions other than the oxidized regions of the Group III nitride semiconductor layer serving as seed crystals") of **claims 18 and 43**, oxidizing portions of a surface of the underlying Group III nitride semiconductor layer to form oxidized regions for functioning as a mask is known in the pertinent art therefore such oxidizing would have been obvious; see, for example, Sasaoka U.S. Patent Application Publication 2003004249, paragraph [0188].

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

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3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1 and 30-47** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sarayama et al. U.S. Patent 6592663 (the '663 reference) in view of D'Evelyn et al. U.S. Patent Application Publication 20040124434.

Referring to **claims 1 and 30**, the '663 reference discloses a method of manufacturing a Group III nitride substrate as claimed but fails to teach that the layer from which a plurality of portions are prepared and selected as seed crystals is formed of a Group III nitride semiconductor layer. In particular, the '663 reference discloses, in Figs. 12-15 and respective portions of the specification:

a method of manufacturing a Group III nitride substrate, comprising, in an atmosphere including nitrogen (N, Fig. 12), allowing a Group III element (from melt 102A, Fig. 12 and column 5, lines 50-54) and the nitrogen to react with each other in an alkali metal melt (102A, including Na, which is an alkali metal) to cause generation and growth of Group III nitride crystals,

wherein a plurality of portions of a layer (701, column 9, lines 11-20, Figs. 12-15, and note that cover member 803, having opening 803A (Figs. 15B and 16, column 10, lines 1-20) including smaller openings – Fig. 15B – that when cover the seed crystal layer 701 form portions of the layer 701) are prepared, selected as seed crystals, and used for at least one of the generation and the growth of the Group III nitride crystals, and then

surfaces of the seed crystals (defined by seed crystal layer 701 and smaller openings of opening 803A, as noted above) are brought into contact with the alkali metal melt (102A).

However, as noted above, the '663 reference fails to teach that the seed crystal layer 701 is formed from a Group III nitride semiconductor layer.

D'Evelyn, in also disclosing a method of manufacturing a Group III nitride substrate by growing the Group III nitride substrate 132 from seed crystal 120 (Fig. 1), teaches that among a variety of seed crystals, seed crystals formed from a Group III nitride semiconductor layer is preferred because of easier process control and higher quality (paragraphs [0030] and [0031]: "Nucleation for GaN growth may be induced on the crystal growth portion of the capsule at a nucleation center without a seed crystal, such as a portion of the container wall, or with a non-GaN seed crystal such as sapphire, for example. It is preferred, however, that a GaN seed crystal is provided, because the process is easier to control and the quality of the grown crystal is higher.")

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the '663 reference's seed crystal layer 701, from which crystal regions are formed, from a Group III nitride semiconductor layer. One would have been motivated to make such a change in view of the teachings in D'Evelyn that such seed crystals are easier to form and of higher qualities.

Referring to **claim 31**, the reference further discloses that the atmosphere is a pressurized atmosphere (column 5, lines 22-40).

Referring to **claim 32**, although the reference fails to disclose that the melt further comprises alkaline-earth metal, alkaline-earth metal, similarly and in addition to alkali metal, has been used in the art to add to the melt, such as disclosed by D'Evelyn, paragraph [0037], therefore such addition would have been obvious to one of ordinary skill in the art.

Referring to **claim 33**, the reference further discloses that the Group III nitride crystals are grown while the seed crystals is rocked in the melt (by motor 703).

Referring to **claims 34-37**, as the reference does not limit a cycle of the portions of the seed crystal layer, it would have been obvious to specify a cycle as claimed.

Referring to **claims 38-42**, as the reference does not limit a cycle of dense dislocation areas, it would have been obvious to specify a cycle of dense dislocation areas as claimed.

Referring to **claims 43-45**, as the claims are directed to a device, the limitations in the claims are considered product-by-process limitations and are considered non-limitation.

Referring to **claims 45-47**, the reference further discloses that a semiconductor optoelectronic element, such as a laser diode or a light emitting diode, can be formed on the Group III nitride substrate (column 6, lines 1-8), and according to D'Evelyn, the Group III nitride substrate of semiconductor optoelectronic elements could comprise diamond-like carbon (carbide, paragraph [0003]), therefore such utilization of known and suitable material would have been obvious to one of ordinary skill in the art.

5. Claims 1 and 30-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata et al. U.S. Patent 6270569 (the '569 reference).

Referring to **claims 1 and 30**, the '569 reference discloses in Embodiment 14 (column 17, Fig. 14) a method of manufacturing a Group III nitride substrate as claimed including the Group III nitride semiconductor layer 111 but fails to teach that a plurality of portions are prepared and selected as seed crystals from the Group III nitride semiconductor layer. In particular, the '569 reference discloses, in Fig. 14 and respective portions of the specification:

a method of manufacturing a Group III nitride substrate, comprising, in an atmosphere including nitrogen, allowing a Group III element (106, column 17, lines 15-20) and the nitrogen to react with each other in an alkali metal melt ("flux", including Na, which is an alkali metal, column 5, lines 45-50) to cause generation and growth of Group III nitride crystals,

wherein a Group III nitride semiconductor layer (111) is prepared, selected as seed crystal (column 17, lines 13-16), and used for at least one of the generation and the growth of the Group III nitride crystals, and then surface of the seed crystal (111) is brought into contact with the alkali metal melt (106, with the processing temperatures and additive materials as detailed in column 17).

However, as noted above, the '569 reference fails to teach that the semiconductor Group III nitride seed crystal (111) includes a plurality of prepared, selected portions.

Nevertheless, in a Modification, the '569 reference teaches that a plurality of seed crystals can be considered (column 14, lines 42-45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the '569 reference's seed crystal layer 111 such that it has a plurality of seed crystals, or in other words, such that it has a plurality of selected seed crystals. One would have been motivated to make such a change in view of the teachings in the Modification Section that such a change is possible.

Referring to **claim 31**, the reference further discloses that the atmosphere is a pressurized atmosphere (column 17, lines 20-25).

Referring to **claim 32**, although the reference fails to disclose that the melt further comprises alkaline-earth metal, alkaline-earth metal, similarly and in addition to alkali metal, has

been used in the art to add to the melt, such as disclosed by D'Evelyn, paragraph [0037], therefore such addition would have been obvious to one of ordinary skill in the art.

Referring to **claim 33**, the reference further discloses that the Group III nitride crystals are grown while the seed crystals is rocked in the melt (by piston 103).

Referring to **claims 34-37**, as the reference does not limit a cycle of the portions of the seed crystal layer, it would have been obvious to specify a cycle as claimed.

Referring to **claims 38-42**, as the reference does not limit a cycle of dense dislocation areas, it would have been obvious to specify a cycle of dense dislocation areas as claimed.

Referring to **claims 43-45**, as the claims are directed to a device, the limitations in the claims are considered product-by-process limitations and are considered non-limitation.

Referring to **claims 45-47**, the reference further discloses that a semiconductor optoelectronic element, such as a laser diode or a light emitting diode, can be formed on the Group III nitride substrate (column 1, lines 62-67), and according to D'Evelyn, the Group III nitride substrate of semiconductor optoelectronic elements could comprise diamond-like carbon (carbide, paragraph [0003]), therefore such utilization of known and suitable material would have been obvious to one of ordinary skill in the art.

Allowable Subject Matter

6. Claims 2, 12, 18, 25, and respective independent claims, insofar as in compliance with the obviousness-type double patenting rejection detailed above, would be allowable if rewritten in independent form including all of the limitations of the respective base claim and any intervening claims.

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
The following is an examiner's statement of reasons for the indication of allowable subject matter: The cited art, whether taken singularly or in combination, especially when all limitations are considered within the claimed specific combination, fails to teach or render obvious a method of manufacturing a Group III nitride substrate having all exclusive limitations as recited in claims 2, 12, 18, and 25.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tu-Tu Ho whose telephone number is (571) 272-1778. The examiner can normally be reached on 6:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID NELMS can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Tu-Tu Ho
September 14, 2005